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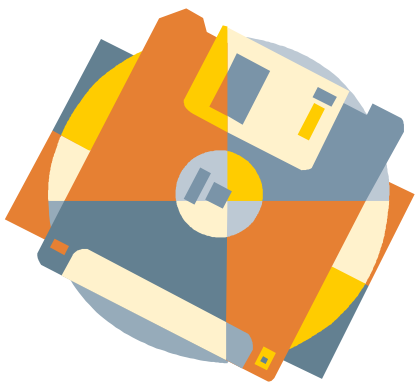
Worldwide Gold Disk Users Conference



Biloxi Mississippi

May 2003

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Access, explore, discover

As density and complexity increase, printed circuit assemblies become tougher for standardized equipment to probe and test. Huntron complements conventional equipment with access and test tools that catch the elusive problems other methods often miss. The keys are physical and virtual access, which translate into meaningful results such as shorter design cycles, improved production yields and lower warranty costs. When you need to test, diagnose or troubleshoot complex circuit boards, Huntron lets you access, explore and discover more

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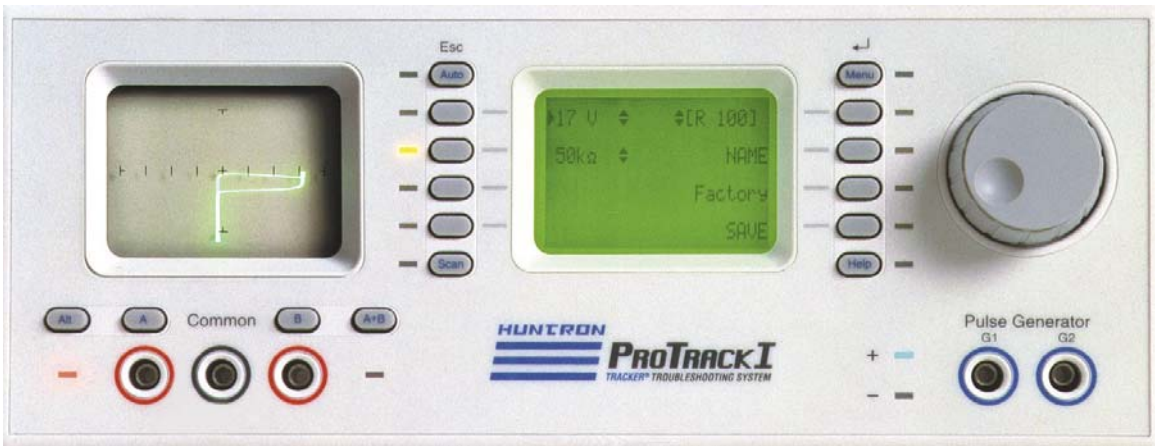
The HUNTRON ProTrack I



Huntron ProTrack I Features

- CRT with graticule overlay
- LCD for range and menu display with menu selection buttons
- Encoder for range and menu control
- A and B channel connections with channel selection controls
- Built-in Pulse Generator for biasing switched devices

The ProTrack I Model 20 enables the user to set the applied voltage, frequency and source resistance to best match the circuit characteristics and display the optimum Tracker signature.

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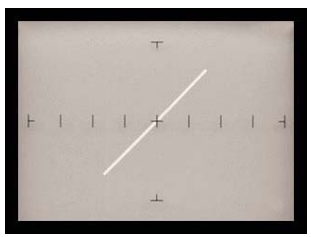
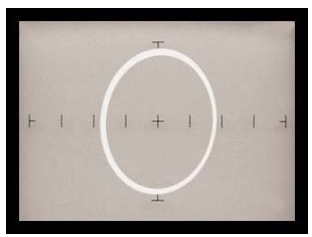
Basic Tracker Signatures

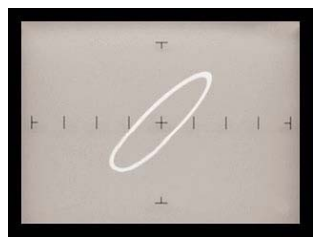
Tracker signatures can be categorized into four basic types -- **resistive, capacitive, inductive** and **semiconductor**. All signatures will exhibit at least one of these characteristics but more often include combinations that are referred to as **composite** signatures.



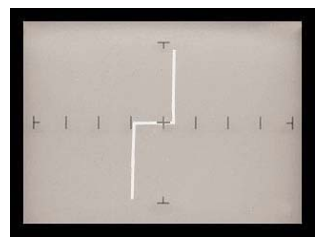
Resistive signatures have a linear response. The trace angle is determined by the value of resistance.



Capacitive signatures have an elliptical response. The trace width is determined by the value of capacitance.

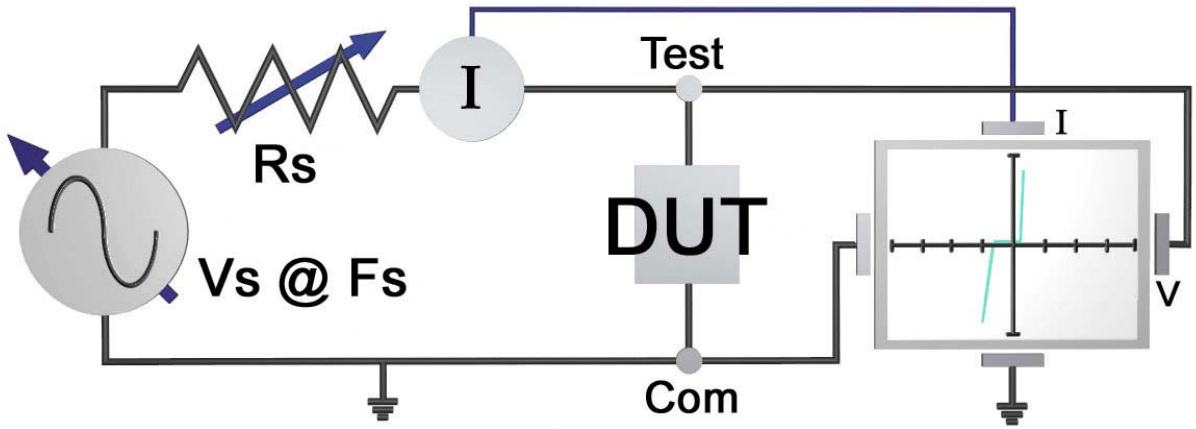


Inductive signatures have an elliptical response. The width is determined by the value and the angle by component resistance.



Semiconductor signatures show the conducting and non-conducting states.

Getting Down to Basics



A current-limited AC signal is applied across two points of an electronic component or circuit. The resulting current/voltage waveform is displayed on a CRT using vertical deflection for current and horizontal deflection for voltage. This unique signature represents the overall “health” of the DUT (device under test).

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The Benefits of Power Off Testing

- Troubleshoot circuitry that cannot be powered due to a catastrophic failure
- Test without the risk of accidental shorting that could cause further damage
- Work effectively on CCAs with mixed technology, i.e. digital *and* analog components
- Perform preventative diagnosis by seeing component flaws that could lead to premature failures

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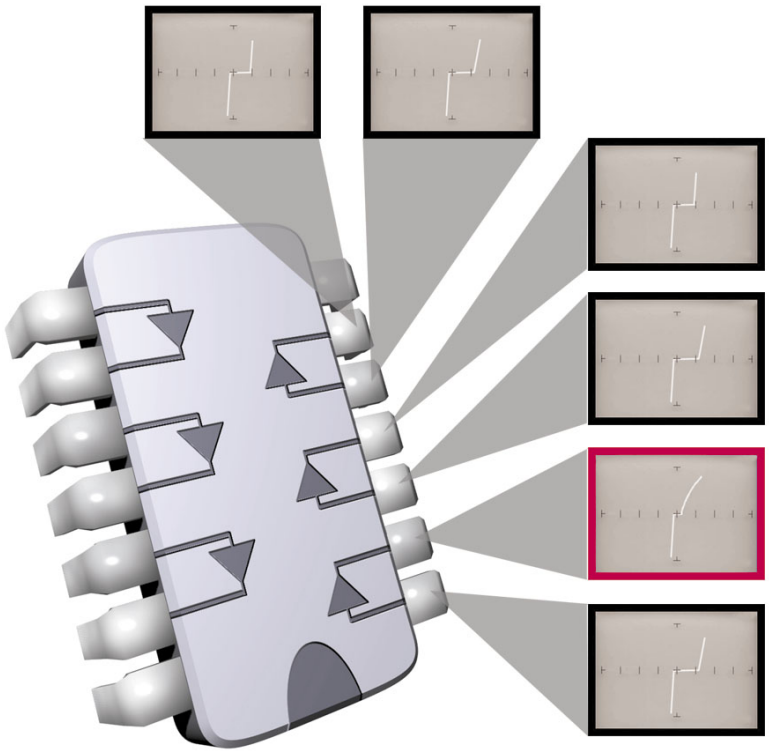
Getting Down to Basics



Troubleshooting with Tracker signatures is possible without the use of documentation or known good circuit boards. This is accomplished by searching for patterns in the signatures that are displayed on like pins of a component or bus.

The Benefits of Tracker Signature Analysis

- Troubleshoot without the use of documentation or a known good board
- Quickly locate problems with digital IC protection circuitry by comparing similar pins
- Effectively search for component failures regardless of the overall board function

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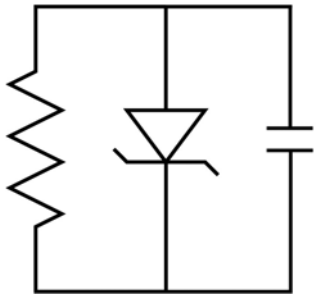
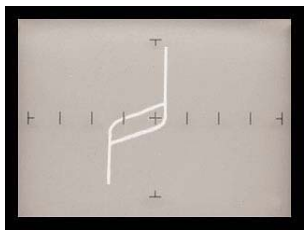
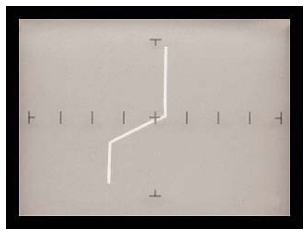
The Value of Variable Test Ranges



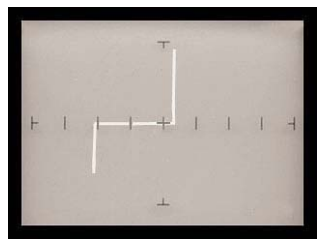
Three variables make up a Tracker test range: voltage (V), internal Tracker resistance (R) and AC sine wave frequency (F). By adjusting any of these three variables, either individually or in combination, characteristics of the Tracker signature can changed. This example shows a simple circuit made up of a diode, resistor and capacitor in parallel. Note how the Tracker range parameters are varied to bring different aspects of the signature into focus.



Voltage: 15V
Resistance: 10KΩ
Frequency: 100Hz
Effects from all of the components are shown in the signature shape



Voltage: 15V
Resistance: 10KΩ
Frequency: 20Hz
By changing frequency, only the diode and resistor affect the signature shape



Voltage: 10V
Resistance: 100Ω
Frequency: 60Hz
Changing the resistance removes the resistive effect from the signature

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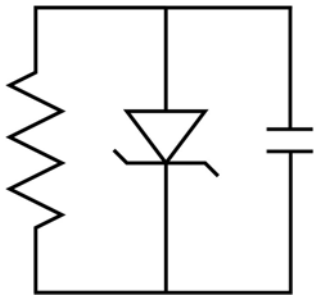
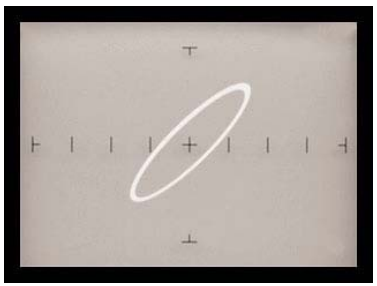
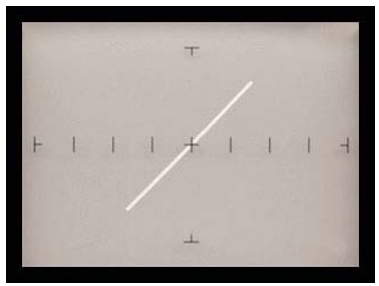
The Value of Variable Test Ranges



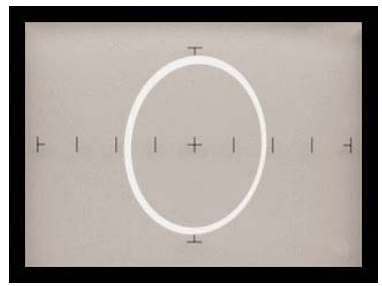
The creation of ProTrack test ranges involves selecting a voltage initially based on the component source voltage. Resistance is selected based on circuit impedance. Frequency is set depending on the presence and value of reactive components.



Voltage: 200mV
Resistance: 10KΩ
Frequency: 200Hz
Using a voltage below 600mV eliminates the diode from the signature



Voltage: 200mV
Resistance: 10KΩ
Frequency: 20Hz
Adjusting the frequency reduces the capacitive effect in the signature



Voltage: 200mV
Resistance: 1KΩ
Frequency: 5KHz
Changing the resistance reduces the effect of the resistor in the signature

The Huntron ProTrack Scanner

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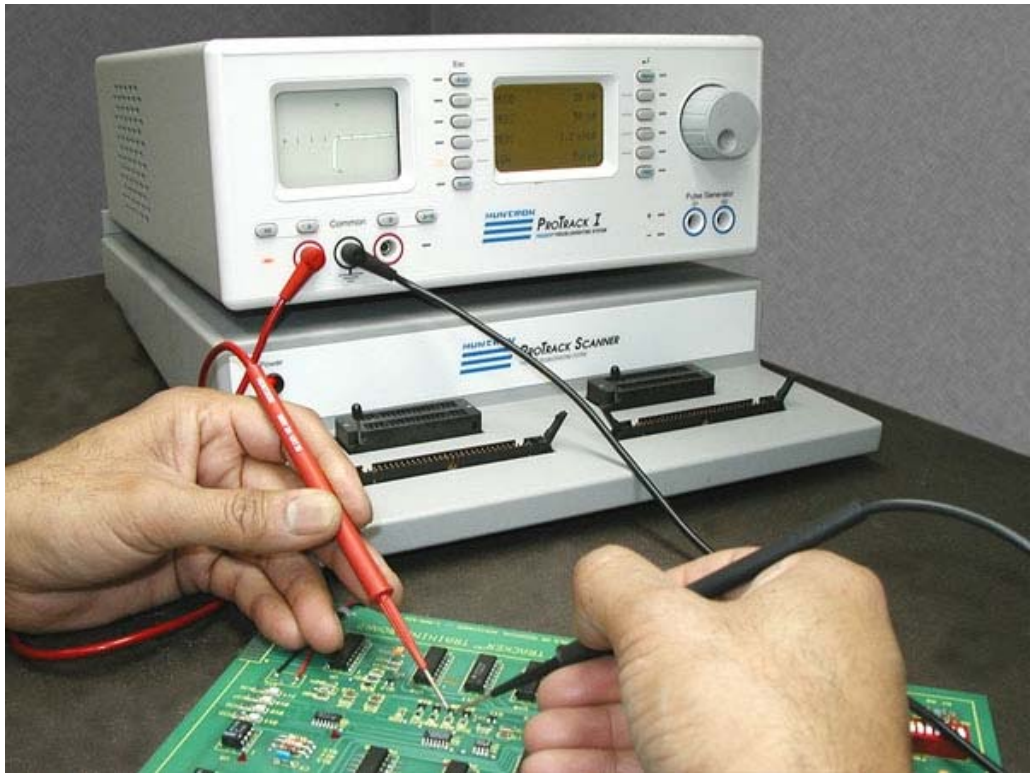

The ProTrack Scanner I consists of two 64 pin channels with IDC headers for cable connections and ZIF (zero-insertion force) sockets for testing discrete ICs. The ProTrack I Model 20 and ProTrack Scanner I combination can be used as a stand-alone system to make quick comparisons between two PCAs. When connected to a personal computer running Huntron Workstation for Windows® software, the ProTrack I and Scanner I can scan and store component signatures for later reference when testing suspect boards.

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Huntron Robotic Probers

Huntron Probers can act as a universal fixture

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Huntron ProTrack Robotic Probers

New Color Camera for targeting and alignment

The Benefits of ProTrack Robotic Probers

- Interface to components down to 20 mils (0.020”) lead spacing
- Significantly decrease test development and run times compared to manual methods
- Standard BNC connectors enable the use of external test equipment such as oscilloscopes
- Extend the testing capabilities by combining with a Huntron ProTrack Scanner for interface to additional reference points, i.e. bed-of-nails, PCA connectors

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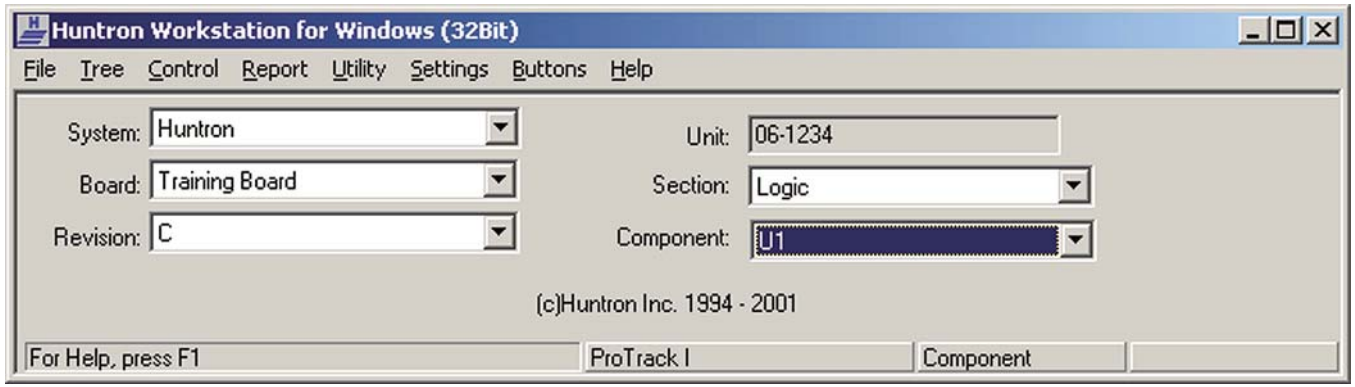
Huntron Workstation software



Key Features

- Create custom test routines for low volume manufacturing and rework applications
- Support of optional utilities for conversion of CAD data for test creation
- Easily store and modify test databases
- View, print and store test results immediately
- Transfer test information between Huntron workstations
- Support for Windows 95/98/ME and Windows NT/2000

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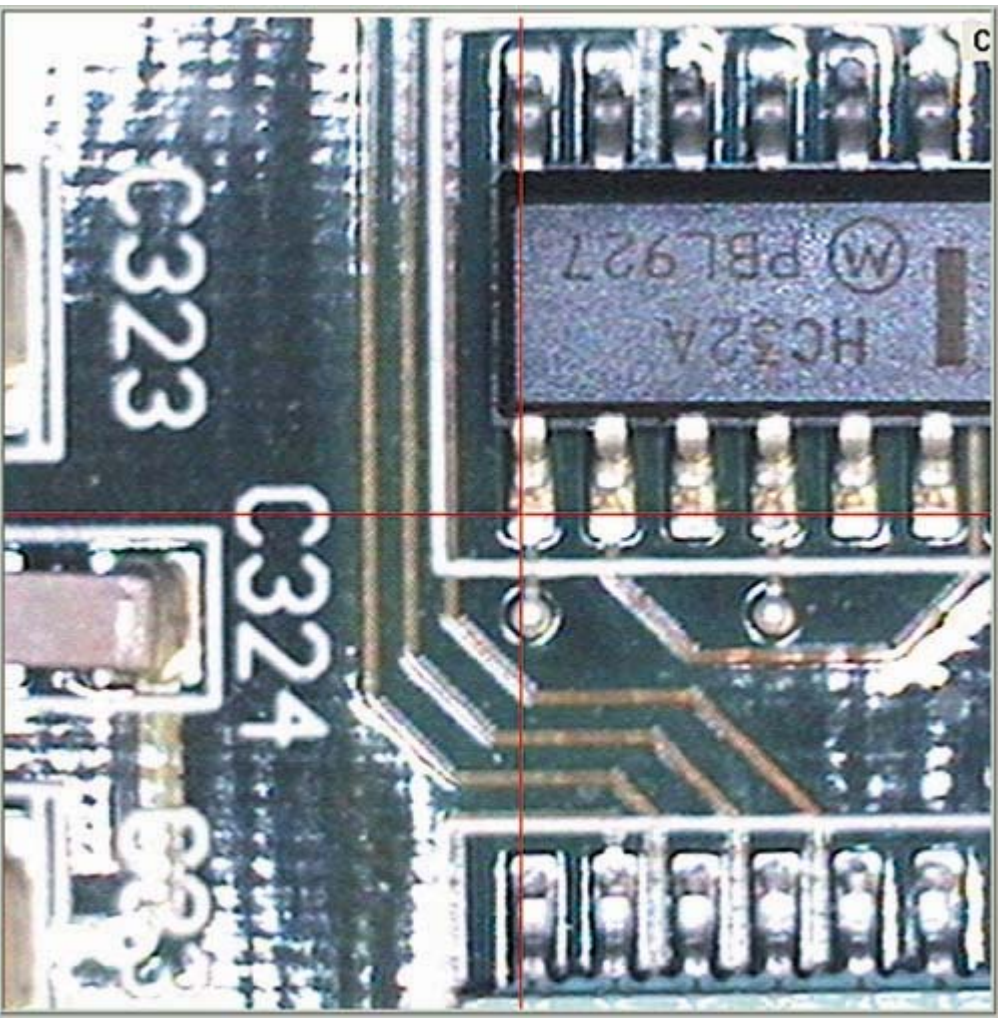
Robotic Prober Teach



- Robotic Prober users can teach component pin locations using the built-in camera system
- Key points on the component such as the first, last and diagonal pins are used to quickly locate and teach the remaining pins

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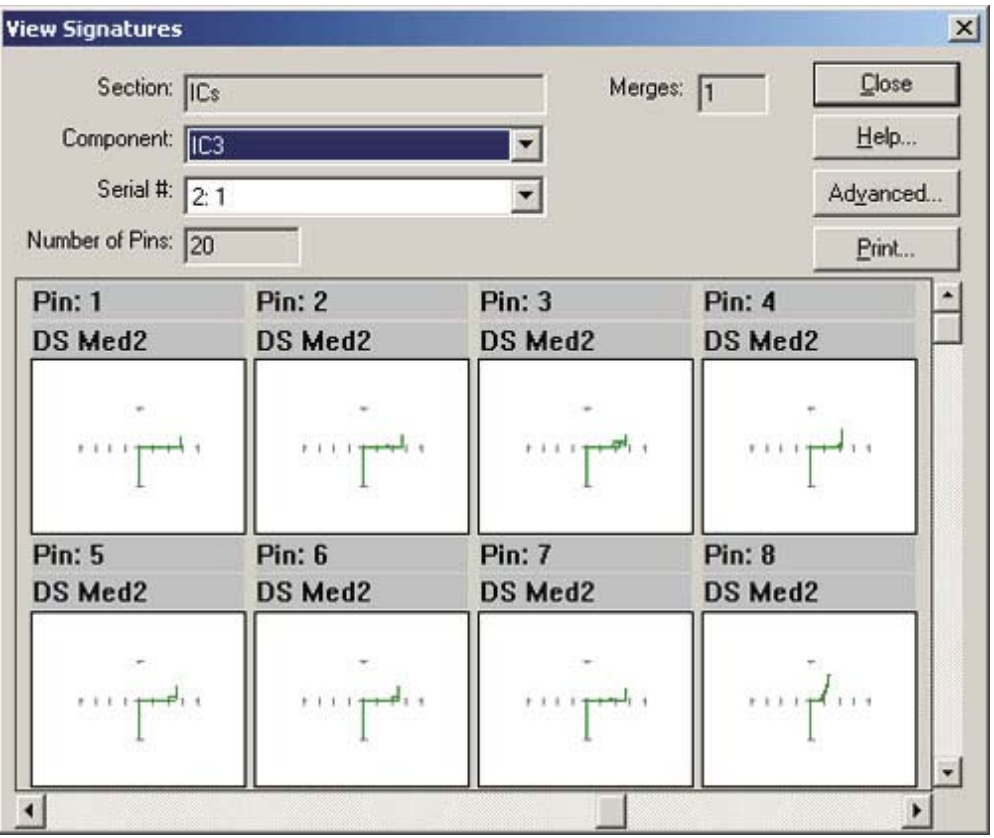
View Signatures



-View component signatures , eight pins at a time

- Verify signatures before storing
- Click on any signature box to zoom in for a closer look
- Use the horizontal and vertical scroll bars to view other ranges and pins

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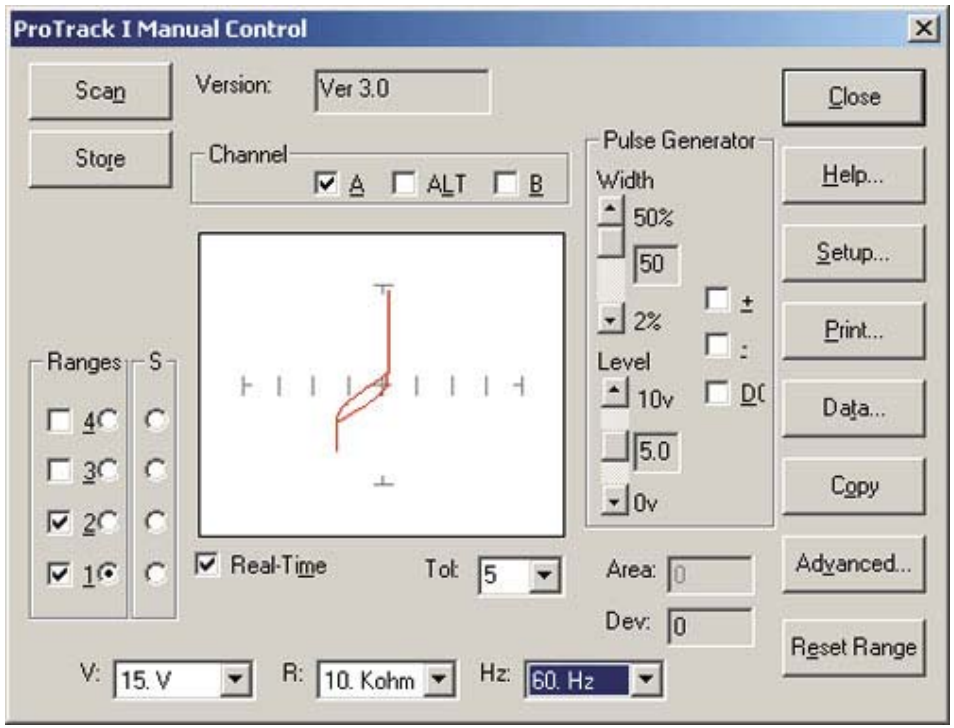
View Signatures with Manual Hardware Control



- Operate the Huntron ProTrack and view signatures using on-screen Manual Control
- Manually adjust test range parameters to obtain the most useful signatures
- Connect to components using hand held probes, a ProTrack Scanner or a Robotic Prober

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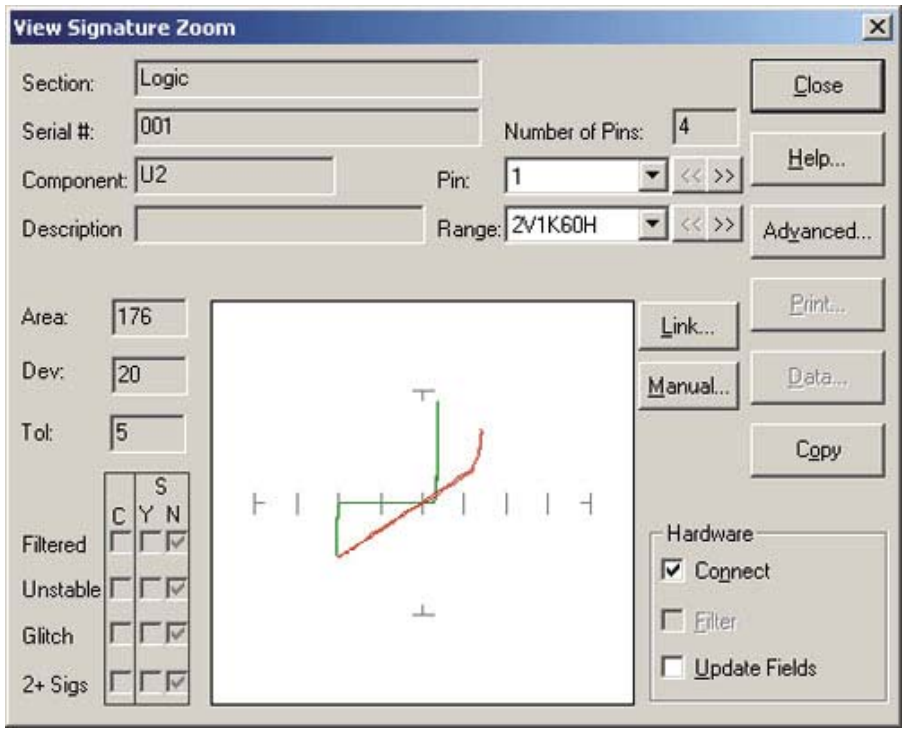
Zoom In on Signatures



- Get a close real-time look at signature differences with the View Signatures Zoom feature
- Jump to on-screen Manual Control for further analysis
- To assist troubleshooting problem boards, link to a board layout viewer with the click of a button

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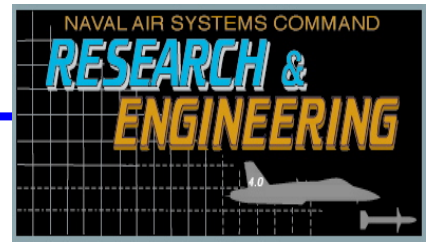

Aviation Gold Disk Program

Richard C. Ferry
NAVAIR 4.8.1.3

NAVAIR

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Gold Disk Program

- ***Cost Savings***
  - Low Cost Gold Disks ($10-$15K per SRA) Enhance I Level Repair Capability
  - Reduces the Number of Spares Buys in the Future
- ***Operational Readiness***
  - Increases availability of RFI spares inventory
  - Increase to Flight Hours (MTBF Increase)
  - Offsets long lead times in Procurement/Repair Contracts
- ***Improved Self Sufficiency (DMS Concerns)***
  - Activities become less dependent on Depot/Manufacturer Support
  - Reduction to Backlog of Spares in Repair or Contract Delivery Dates have less of an Impact to Platforms

- ***Decrease to Procurement/Repair Contracts of Spares***
- ***Low Cost Investment to Support Equipment***
  - No Special Calibration (BIT)
  - **Configuration Consistency (Navy, USMC, USAF, USA, USCG and 9 Foreign Countries are Utilizing Gold Disk Test Routines)**
  - Minimal Life Cycle Maintenance
    - Gold Disk Developed with Huntron increases reliability and can allow for a controlled transition to next generation replacement
    - Repair/Replacement Parts in Stock System
- ***Additional Quality Control***
  - Touch Capability
    - Technicians performing Signature Learns of 3 CCAs for development increase probability of isolating
      - Defective Solder Joints
      - Inaccurate Modifications
      - Damage or Abuse to Circuit Cards

- ***Managing Obsolescence***
  - Provides flexibility in developing short-term solutions for managing Life Cycle Support
  - Provides planned management for Diminishing Manufacturing Sources (Obsolescence) by improving self sufficiency of Intermediate Level activities and less dependency on Depot/Manufacturing Support.
  - Allows for more control over costs associated with the integration of technologies.

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2002 Gold Disk Score card

Repairs 60,400

Net Savings (No Labor accounted for)

$161,551,000.00

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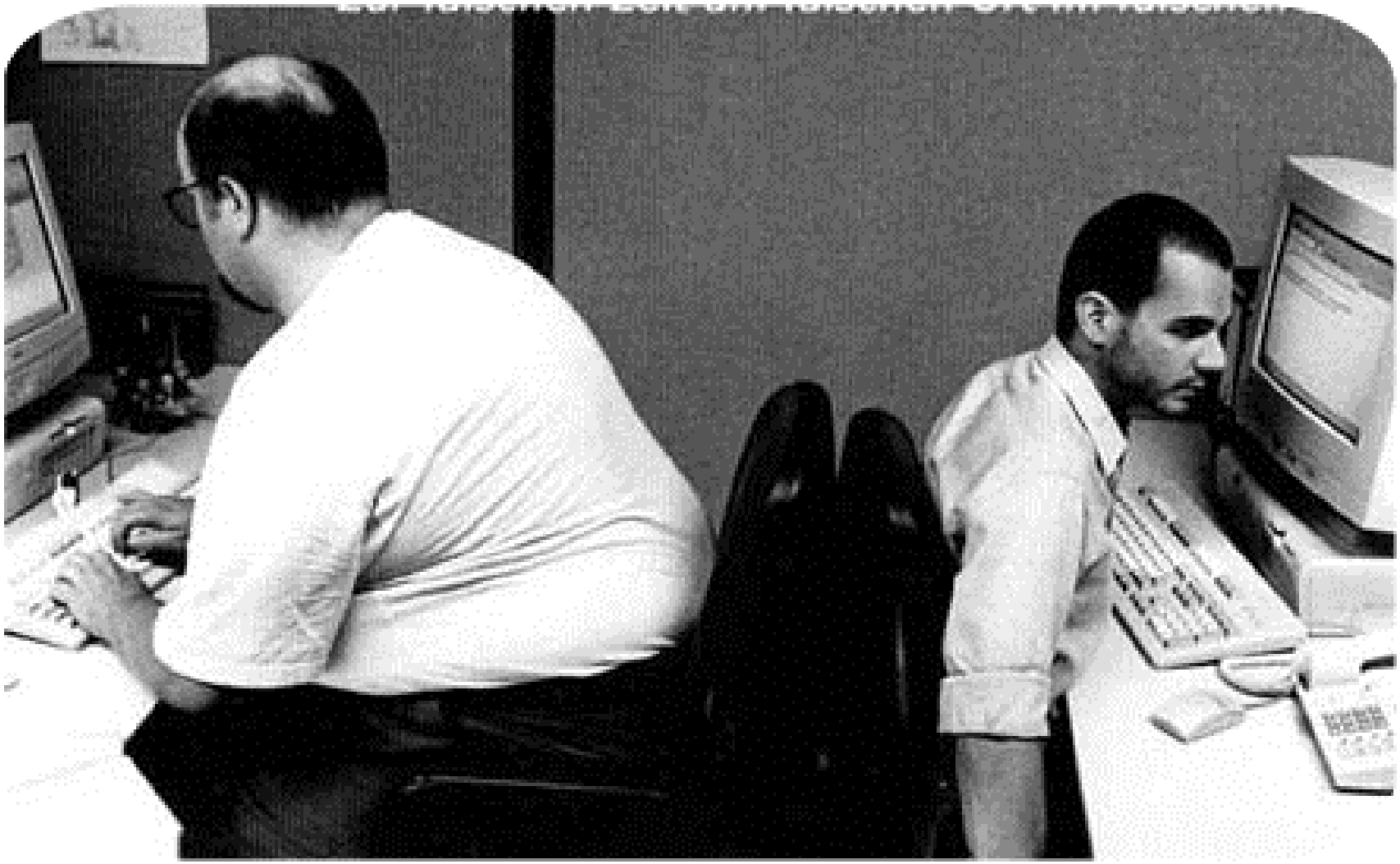

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Contract Update

- Rhode Island
- Mechanicsburg
- Training
- software updating and Frontline
- GSA

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USAF Prober Upgrade Program

- **Huntron RP388 trade in:**
  A credit of $10,000.00 will be applied towards the purchase of a Huntron Prober IIIc, retail price is $34,995.00 - less trade-in allowance of $10,000.00 = **$24,995.00** as the purchase price.
- To receive this credit, you must return the used Huntron RP388 within 90 days after receiving the Huntron Prober IIIc. (Failure to return the PR388 will result in Huntron invoicing for the additional $10,000.00). Customer will pay freight on the return of the used RP388.

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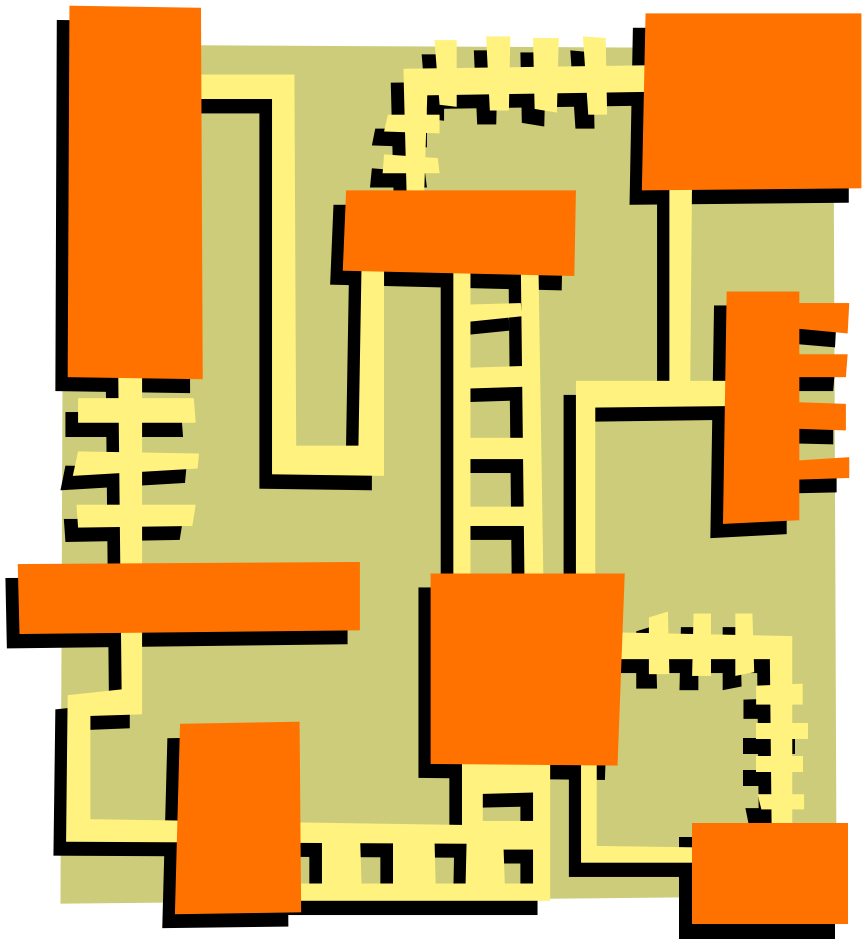
Product Road Map



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Tracker 2700

- Features Huntron SigAssist™ for display of signature resistance, capacitance and breakdown voltage
- Test gate-fired devices with a built-in DC voltage source
- High resolution color LCD for signature and menu display
- Individually select source voltage, source resistance and test frequency to create over 100 range combinations
- CE Certified

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HUNTRON Tracker 2700S

- The 2700 with a built-in 40 pin Scanner
- Will be the "technology upgrade" for the 2000 and 410.
- Uses the same range conventions as the ProTrack
- Getting initial specs, NRL, etc done now
- Targeted to be under contract for next fiscal year.(2004)

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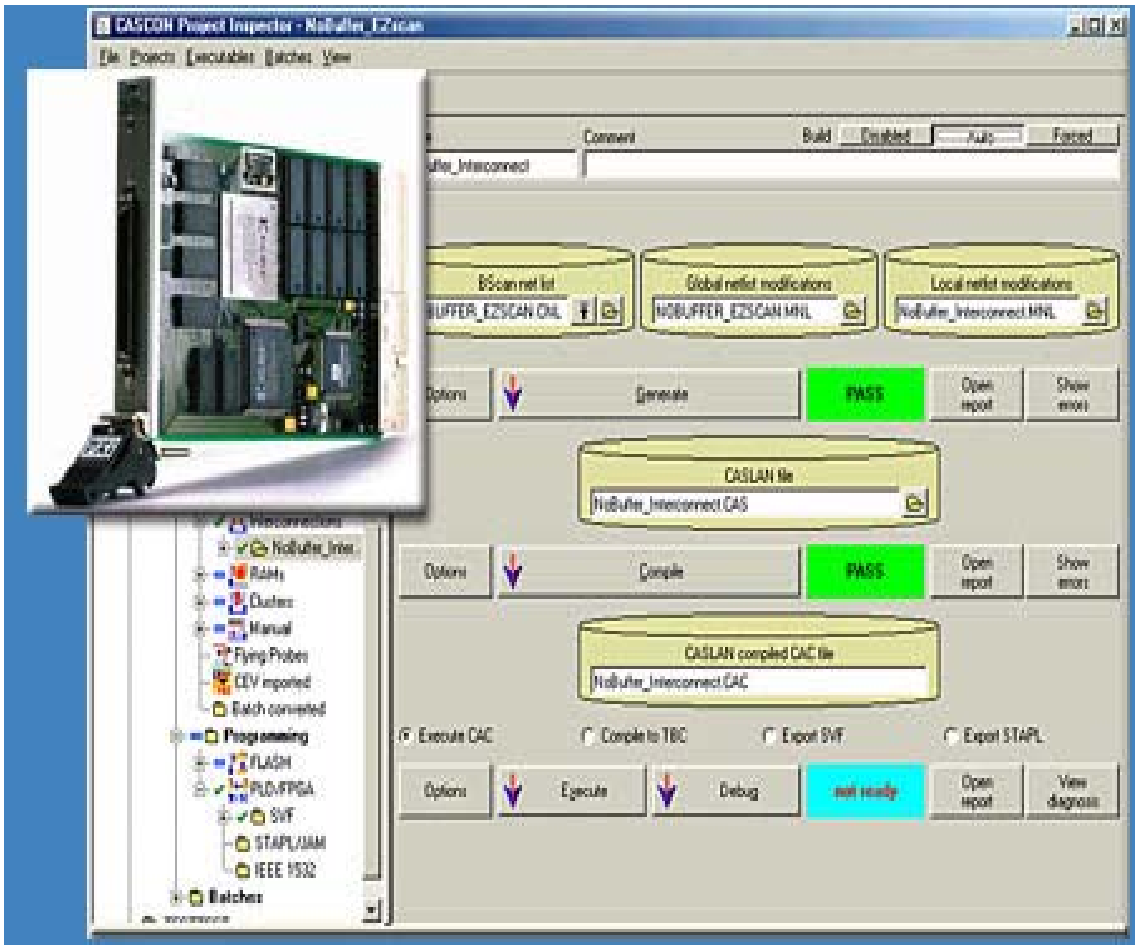
GOEPEL electronics Boundary Scan tools



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Introduction to IEEE-1149.1

- Why Boundary Scan was developed:
  - Less access due to
    - higher density on PCB,
    - PCB shielding,
    - increasing device pin count (BGA, FBGA, CSP, etc.),
    - Smaller device geometry and pin pitch,
  - Results in
    - Reduced test access
    - Increased cost of test (highly complex bed-of-nail adapters)

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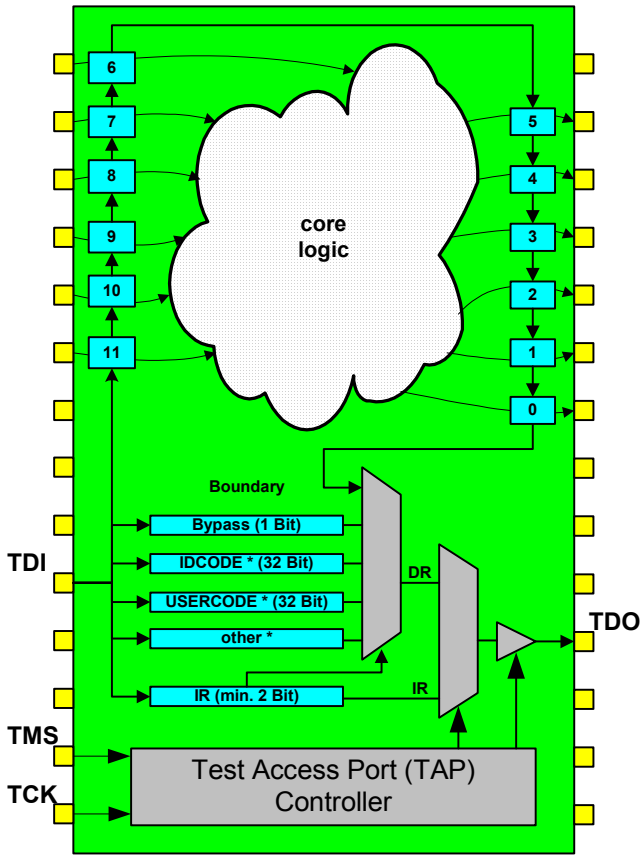
Standard Approach To Test

- Developed by the Joint Test Action Group (over 200 SC, test, and system vendors) starting in the mid '80"s
- Sanctioned by IEEE as STD 1149.1 Test Access Port and Boundary-Scan Architecture in 1990
- Solution: Build test facilities/test points into chips
- Focus: Ensure compatibility between all compliant ICs



Strategic Alliances

- Digital test tools
  - Goepel
    - Spea -
    - Takaya
    - WK Test
- CAD conversion
  - Router Solutions
- Third party instrumentation access
  - National Instruments

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EZScan Boundary Scan Tutorial

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Automated Probing Station

Instrumentation

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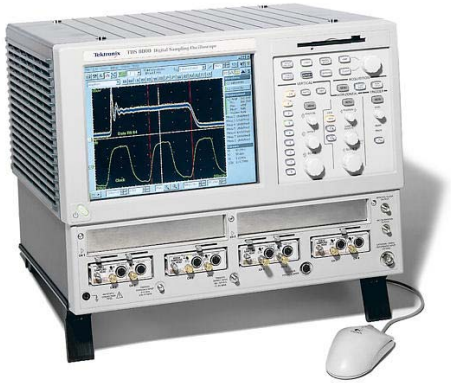
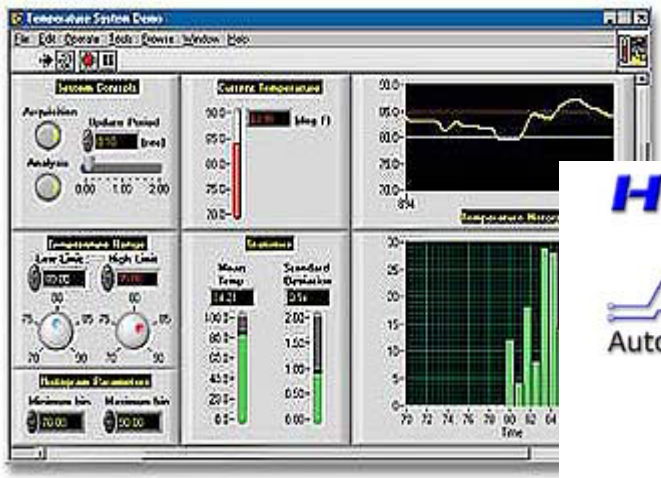


Automated Guided Probe Applications

NI Labview Drivers



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When you need to test,
diagnose or troubleshoot
complex circuit boards,
Huntron lets you --

Access, Explore and **Discover** more.